

Introduction to Probability

Name: _____ Date: _____ Score: _____ / 24

Q Quick Review

Probability measures how likely an event is. It is a number from 0 (**impossible**) to 1 (**certain**); a probability of $\frac{1}{2}$ means **equally likely** to happen or not. When all outcomes are **equally likely**, the probability of an event is $P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{total number of outcomes}}$. Always write the answer as a fraction in **simplest form**. For example, rolling an even number on a standard die has 3 favorable outcomes out of 6, so $P = \frac{3}{6} = \frac{1}{2}$.

◇ **Example:** A bag has 4 red, 6 blue, and 2 green marbles. Find the probability of drawing a green marble.
 ⇒ First count the total marbles: $4 + 6 + 2 = 12$. The favorable outcomes are the green marbles, and there are 2 of them. So the probability is $\frac{2}{12}$. Now simplify by dividing the top and bottom by 2: $\frac{2}{12} = \frac{1}{6}$. So there is a $\frac{1}{6}$ chance of drawing green.

Answer: $\frac{1}{6}$

PRACTICE

Find each probability. Write your answer as a fraction in simplest form.

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| 1. P(heads) on one coin flip _____ | 12. Spinner with 8 equal sections, 2 red. P(not red) _____ |
| 2. P(rolling a 3) on a standard die _____ | 13. Letters of MATH: P(choosing a vowel) _____ |
| 3. P(rolling an even number) on a die _____ | 14. Numbers 1–10: P(an even number) _____ |
| 4. P(rolling a number ≤ 4) on a die _____ | 15. Numbers 1–20: P(a multiple of 5) _____ |
| 5. P(rolling a 7) on a standard die _____ | 16. Bag: 4 red, 6 blue, 2 green. P(blue) _____ |
| 6. P(rolling a number < 7) on a die _____ | 17. Bag: 4 red, 6 blue, 2 green. P(not blue) _____ |
| 7. P(prime number) on a die: primes are 2,3,5 _____ | 18. Days of the week: P(a day starting with S) _____ |
| 8. Bag: 3 red, 9 blue. P(red) _____ | 19. Standard deck: P(drawing a spade) _____ |
| 9. Bag: 3 red, 9 blue. P(blue) _____ | 20. Letters of MATHEMATICS: P(a vowel) _____ |
| 10. Bag: 5 red, 15 blue. P(red) _____ | |
| 11. Spinner with 8 equal sections, 2 red. P(red) _____ | |

◆ Word Problems

21. A jar holds 5 cherry, 3 grape, and 2 lime candies. If you pick one without looking, what is the probability it is grape? _____
22. A spinner has 10 equal sections numbered 1 through 10. What is the probability of landing on a number greater than 7? _____
23. In a class of 24 students, 18 ride the bus. If the teacher picks one student at random, what is the probability that student does *not* ride the bus? _____
24. A weather app says there is a 0 probability of snow in July and a probability of 1 that the sun will rise tomorrow. Describe what each of these probabilities means. _____



Answer Keys

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| <p>1. $\frac{1}{2}$</p> <p>2. $\frac{1}{6}$</p> <p>3. $\frac{1}{2}$</p> <p>4. $\frac{2}{3}$</p> <p>5. 0</p> <p>6. 1</p> <p>7. $\frac{1}{2}$</p> <p>8. $\frac{1}{4}$</p> <p>9. $\frac{3}{4}$</p> <p>10. $\frac{1}{4}$</p> <p>11. $\frac{1}{4}$</p> <p>12. $\frac{3}{4}$</p> <p>13. $\frac{1}{4}$</p> | <p>14. $\frac{1}{2}$</p> <p>15. $\frac{1}{5}$</p> <p>16. $\frac{1}{2}$</p> <p>17. $\frac{1}{2}$</p> <p>18. $\frac{2}{7}$</p> <p>19. $\frac{1}{4}$</p> <p>20. $\frac{4}{11}$</p> <p>21. $\frac{3}{10}$</p> <p>22. $\frac{3}{10}$</p> <p>23. $\frac{1}{4}$</p> <p>24. 0 = impossible, 1 = certain</p> |
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Step-by-Step Explanations

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| <p>1. A coin has 2 equally likely sides and 1 is heads: $\frac{1}{2}$.</p> <p>2. There is 1 way to roll a 3 out of 6 faces: $\frac{1}{6}$.</p> <p>3. The even faces are 2, 4, 6 — that is 3 out of 6, which simplifies to $\frac{1}{2}$.</p> <p>4. The faces 1, 2, 3, 4 work — 4 out of 6, which simplifies to $\frac{2}{3}$.</p> <p>5. A die has no face showing 7, so this event is impossible: probability 0.</p> <p>6. Every face (1 through 6) is less than 7, so this event is certain: probability 1.</p> <p>7. The primes 2, 3, 5 give 3 favorable faces out of 6: $\frac{1}{2}$.</p> <p>8. There are 12 marbles total and 3 are red: $\frac{3}{12} = \frac{1}{4}$.</p> <p>9. There are 9 blue out of 12: $\frac{9}{12} = \frac{3}{4}$.</p> <p>10. 20 marbles total and 5 red: $\frac{5}{20} = \frac{1}{4}$.</p> <p>11. 2 red sections out of 8: $\frac{2}{8} = \frac{1}{4}$.</p> <p>12. 6 of the 8 sections are not red: $\frac{6}{8} = \frac{3}{4}$.</p> <p>13. MATH has 4 letters and 1 vowel (A): $\frac{1}{4}$.</p> <p>14. There are 5 even numbers from 1 to 10: $\frac{5}{10} = \frac{1}{2}$.</p> | <p>15. The multiples are 5, 10, 15, 20 — 4 out of 20: $\frac{4}{20} = \frac{1}{5}$.</p> <p>16. 12 marbles total, 6 blue: $\frac{6}{12} = \frac{1}{2}$.</p> <p>17. 6 of the 12 marbles are not blue: $\frac{6}{12} = \frac{1}{2}$.</p> <p>18. Saturday and Sunday start with S — 2 out of 7 days: $\frac{2}{7}$.</p> <p>19. A deck has 13 spades out of 52 cards: $\frac{13}{52} = \frac{1}{4}$.</p> <p>20. MATHEMATICS has 11 letters; the vowels A, E, A, I total 4: $\frac{4}{11}$.</p> <p>21. There are $5 + 3 + 2 = 10$ candies in all, and 3 are grape. So the probability is $\frac{3}{10}$, which is already in simplest form.</p> <p>22. The numbers greater than 7 are 8, 9, 10 — that is 3 favorable sections out of 10, so the probability is $\frac{3}{10}$.</p> <p>23. If 18 of 24 ride the bus, then $24 - 18 = 6$ do not. The probability is $\frac{6}{24} = \frac{1}{4}$.</p> <p>24. A probability of 0 means the event cannot happen at all — snow in July is treated as impossible. A probability of 1 means the event is certain to happen, like the sun rising.</p> |
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